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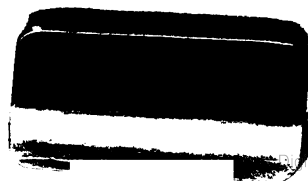
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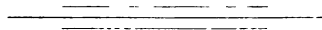
CENTRAL STATION

MANAGEMENT AND FINANCE.

BY

HORATIO A. FOSTER.

*(Member American Institute Electrical Engineers; Special Census Agent for Central Stations.)*



NEW YORK :  
C. C. SHELLEY, PUBLISHER,  
10 AND 12 COLLEGE PLACE.

1891.

TO THE  
ELECTRICAL FRATERNITY  
OF THE  
UNITED STATES  
THIS  
BOOK IS DEDICATED.

*Copyright, 1891, by CHARLES C. SHELLEY.*

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## PREFACE.

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THE contents of this book are based upon a series of articles prepared by the author at the request of the editors of THE ELECTRICAL ENGINEER and published in that journal during the present year. It has been the aim throughout to develop a practical plan applicable to the vast majority of central stations in this country, and to lay down rules not only for a good scheme of organization, but for a satisfactory basis of account-keeping. The text embodies a large number of forms, blanks, sheets, registers, tickets labels, analyses, etc., such as have been in actual use by the writer, and the regular employment of which has added greatly to the efficiency and earning capacity of central stations with which he has been connected. Interspersed in the text will be found many hints and suggestions that deal with station operation and that bring out the close relationship between sound engineering and scientific bookkeeping. In a station that is properly conducted, the system of organization that is established in the dynamo-room and the engine-room will run through to the last figure of its balance sheet. The hands of the superintendent or electrical engineer will be immeasurably strengthened by the knowledge he enjoys of the manner in which his work is telling day by day in higher economy of operation and in the growing margin of profit.

While almost any of the blanks may be used individually, the author earnestly recommends a close adherence to the general scheme he has worked out. He has been much gratified by the approval bestowed on the articles not only by parent and local companies, but by leading authorities here and abroad.

HORATIO A. FOSTER.

NEW YORK CITY, September 1, 1891.





# CENTRAL STATION MANAGEMENT AND FINANCE.

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## CHAPTER I.

### PLANS OF ORGANIZATION.

IN the earlier days of electric lighting, when prices ranged all the way from 70c. to \$1.00 per arc lamp per night, and the incandescent lamp had but just started, central stations, which under ordinarily good management should have returned very large profits, were run in a most lavish manner as to expense, and too often, on the contrary, proved rank failures. This, too, with machinery which has no very decided improvement to-day, and almost no change in the lamps used.

The central station business was so new that very few well-established business men could be persuaded to take hold of its management, and it gradually fell into the hands of younger, untried men, who too often were more prone to experiment with the business than to spend the necessary time in organizing it thoroughly on an economical basis. Again, the majority of those so placed had not the previous business experience to understand fully the necessity of systematic organization and strict discipline.

In the matter of labor, the various departments had not been gauged so as to determine what was a fair day's work and what would be the proper number of employees. Take the matter of carbon trimming alone ; it was not so long ago that

40 lamps per day was considered the proper number for a man to clean and trim, when at the present time from 70 to 90 is considered a fair average ; and in some places 100 is the standard, and stations have been known where 120 per man were crowded on. Other departments were similarly crowded, and many times men, recommended by some friendly official who had been influential in helping through city contracts, were given places when they were not needed. This, added to the extreme tenderness of the dynamo machine as then constructed, all helped to try the patience of the capitalist.

At the present time, when prices have been pushed down to bed-rock by economically inclined mayors and city officials, and sharp competition has set in, it is necessary to practice all the small economies which can only come from careful organization and strict discipline, and a most careful system of accounts, both of financial and operating departments. To that end, the writer has endeavored to outline a complete system of reports which shall embody all the points necessary to be kept in sight in order to show at any time the exact condition of any department, and by recapitulation, to indicate the state of the business at regular periods, both financially and as to efficiency of operation.

The style of station taken as an example will be of that very large class which started originally with a small plant of arc lamps and gradually developed into large combined arc, incandescent and power stations. Circumstances will often govern the special method of organization; but the following has been found to meet the general requirements. For stations of the medium size, say 200 arcs and 1,500 incandescents, Diagram No. 1 indicates a good scheme of organization. Larger stations, say from 600 to 2,000 arcs with from 5,000 to 20,000 incandescents, would be better organized upon the plan of Diagram No. 2.

# ORGANIZATION

## Medium Size Station.

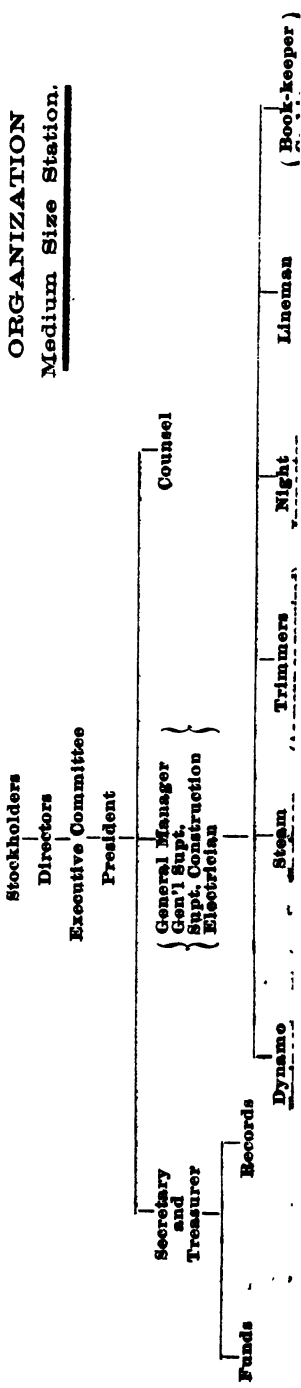
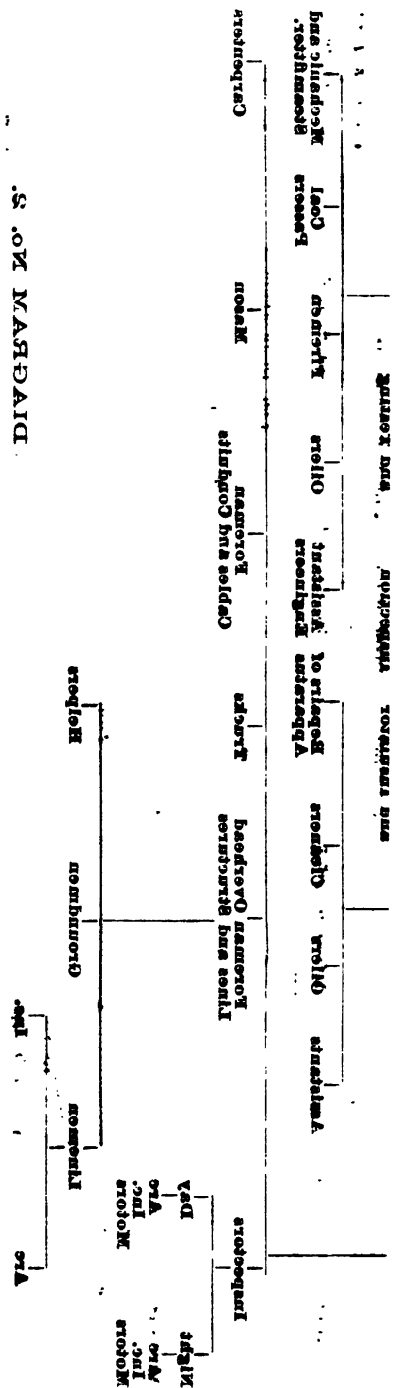
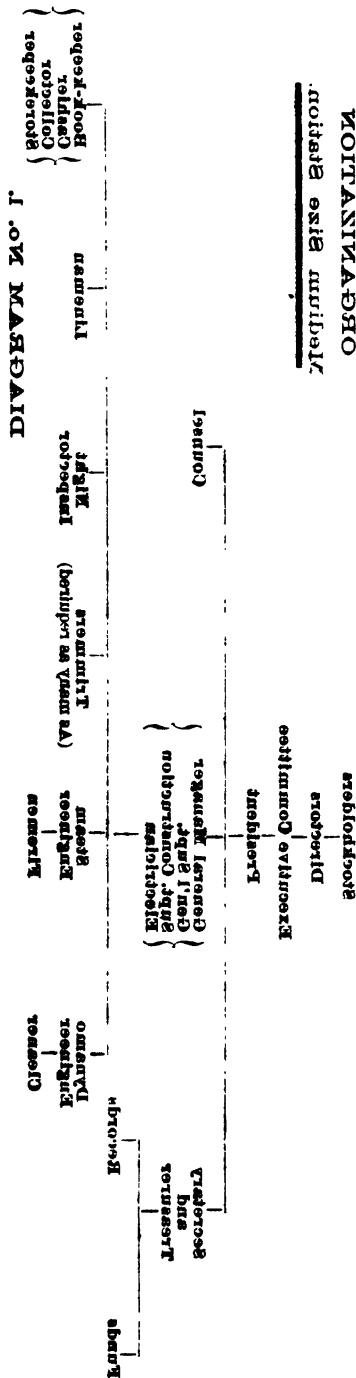
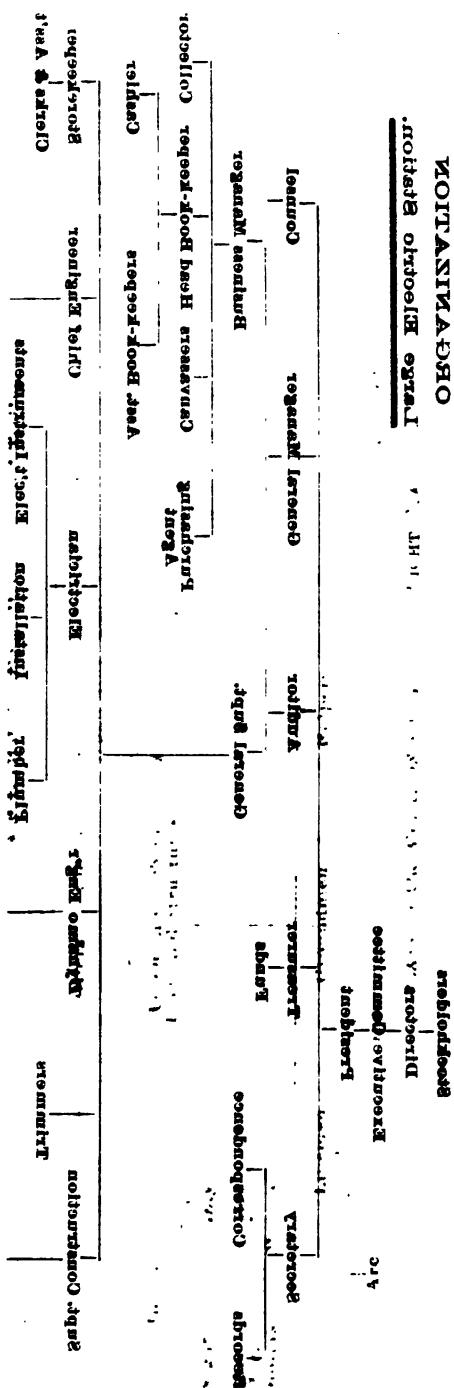


FIGURE NO. 3





Medium size station  
ORGANIZATION

## CHAPTER II.

## DEPARTMENTAL ORDER BLANKS.

THE organization naturally divides itself into the station or operating department and office or financial department. As the latter is not materially different from any other counting-room system, we shall treat it with rather short mention, and that only at the end of the article.

All stations should be provided, first, with a comfortable office for the officials, who necessarily have to be close at hand; and no man can be expected to make anything like accurate written reports without some place to do his writing. This should be provided for him in some convenient spot, generally under the eye of the superintendent or general foreman.

The next and, in the writer's opinion, the most important thing in the economy of the central station is a well-constructed store-room, where everything of a portable nature, from office pens to cylinder oil, must be kept under lock and key, and only surrendered in quantities required by written orders from a foreman. The blanks necessary for use by the storekeeper will be referred to under the proper head.

Rule No. 1, and the most important regulation of all for the general superintendent, or any general foreman, is that no order for work of any nature be given other than in writing; this will be found to relieve all hands of responsibility by reason of bad memories, or otherwise; keeps a record of the time the order was given and finished, and the cost of executing the same. Blank No. 1, shown here slightly reduced, is a form which has been found to answer this purpose very well, and should be put up for use in books of 100 or 200 leaves.

FORM 1.

The order number at the top must be placed on all requisitions for material from the store-room, and on all labor tickets used on the work indicated. When the job is finished and the slip is returned to the office, the value of all material recorded on the back, and of the labor shown on the labor tickets handed in under that order number, can be calculated and written in, and thus the cost of that particular job referred to at any time.

Where a system of this kind is adopted it is well to issue a few general orders, which should be framed or fastened permanently to some convenient bulletin and kept always in sight.

The orders would read somewhat as follows:

ORDER No. 1.

*Issued.*

*Signed.*

All firemen or employees in the boiler-room will put the above order number on their time tickets and store-room orders.

ORDER No. 2.

*Signed.*

All engineers or employees in the engine-room will put the above order number on their time tickets and store-room orders.

And so on about as follows:

ORDER No. 3.

*For Dynamo Room.*

ORDER No. 4.

*For Offices.*

ORDER No. 5.

*Repairs in Boiler Room.*

ORDER No. 6.

*Repairs on Engines.*

ORDER No. 7.

*Repairs on Electrical Apparatus.*



ORDER No. 8.

*Repairs on Pole Lines.*

ORDER No. 9.

*Repairs on Stations.*

ORDER No. 10.

*Repairs on Inside Wiring.*

If motor work is done, or street car lines are run, additional orders can be issued to cover those departments.

In smaller stations it is perhaps unnecessary to make more than one order for general operating and one more for general repairs, although it is very convenient to know where the repairs were. Such orders will apply to all on the operating pay-roll.

## CHAPTER III.

## BOILER ROOM REPORTS.

WE next take up the regular department reports, commencing with the boiler-room.

This sub-department is, in the opinion of the writer, one of the most important of all, as great waste is so easily made if firemen are careless or ignorant. By all means have the best fireman that money can hire, as he is the man who shovels away your dollars. The data required to show the condition and efficiency of this department is so simple that it is folly not to have the items at hand every day.

Each boiler should have its number, which must be used in all references to it for conditions or repairs.

The average pressure of steam carried should be noted, and any irregular change of pressure should be noted in remarks.

Some engineers keep a regular log, recording the pressure of steam, etc., every half hour or hour; this is not deemed necessary by the writer, as all modern steam plants are provided with a good damper regulator, which will easily keep steam pressure even throughout a run. A good recording gauge is a very handy instrument for use in the larger stations, and is always a good check on the motive-power department.

The amount and kind of fuel fired should be noted, stating in the remarks column any particulars as to quality, that are expected to be noted by officers in charge. Where part wood is used, and it is desired to reduce it to coal equivalent, it is only necessary to multiply its weight by 4, which gives the equivalent in pounds of coal. The weight of ashes and clinkers

removed should always be recorded, as the percentage of waste in fuel indicates the quality.

The amount and temperature of feed-water is also very important. The first, when compared with the amount of fuel consumed, gauges the evaporative efficiency of the boilers.

(Form 2.)

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### Chief Engineer's Report for 24 hours ending 7 o'clock,

A. M., \_\_\_\_\_ 189

DAY RUN.					NIGHT RUN.						
From _____ A. M. to _____ P. M.					From _____ P. M. to _____ A. M.						
Chief Engineer _____ hours					Assistant Engineer _____ hours						
Assistant " _____ "					" " _____ "						
" " _____ "					" " _____ "						
Other _____ "					" _____ "						
Fireman _____ "					Fireman _____ "						
" _____ "					" _____ "						
Coal Passer _____ "					Coal Passer _____ "						
Coal, kind _____					WATER METER.						
Amount used, day run _____ lbs.					PREVIOUS STATE. T. A. M. TO-DAY. CO. FY. USED.						
Amount used, night run _____ lbs.											
Total, _____ lbs.					Average temperature of Feed water taken at _____						
Other fuel, to coal _____ lbs.					o'clock _____ M. _____ degrees						
Ashes removed _____ lbs.					Average temperature of Hot Well _____						
Combustible consumed _____ lbs.					Evaporation _____ lbs. water per lb. coal.						
ENGINES.					BOILERS.						
No. Engine.	Time Started.	Time Stopped.	Hours Run.	Avg. I. H. P.	Avg. Vac. Ins.	No. Boiler.	Time Started.	Time Stopped.	Hours Run.	Avg. Pressure.	Flue Temp.

Signed \_\_\_\_\_ Chief Engineer.

FORM 2.

The only convenient way of recording this is by some good meter. The dial reads in cubic feet, which is reduced to pounds by multiplying by  $62\frac{1}{2}$ .

It is necessary to know the temperature in order to reduce the evaporation to a standard, as, say, from and at  $212^{\circ}$ . A handy and cheap way to take it is to have a **I** inserted in the

run of the feed-pipe, close to the boiler. A plug with a  $\frac{3}{8}$  inch brass tube with its bottom end plugged is screwed into the side opening. This tube is filled with cylinder oil to hold the heat, and the temperature can be taken at any time by putting a small thermometer into the oil.

The names and time of all employees are all that are necessary to give the expense, supplies being given by the store-keeper and only placed on the weekly or monthly report. Blank No. 2, report of chief engineer, has space for all the data mentioned above. The same blank also has space for the necessary data for the engine-room. This data includes the numbers of engines run, with the time of starting and stopping them, and, where possible, the average indicated horse-power. Where engines are used on the same machines—and changes are seldom made—if half-hourly cards are taken for a few nights running, and the average load is figured for them, then cards taken on the same engine at the hour which was found to agree nearest with that average load will be approximately correct. This will be more so if taken on or about the 21st of March or September, which is the average time for the year.

Where condensing or compound engines are used it is well to record the average vacuums. If vacuum varies much, the fact should be noted in "remarks," and the air pump and condenser should be overhauled.

In the space left for remarks should be entered full details of all work done out of the usual routine, such as washing out boilers, repairs on fire-boxes, engines, pumps or other work.

A good chief engineer will find plenty to do to keep the motive-power department up to the best conditions of efficiency. As a general thing, more trouble and waste takes place in this department than in the electrical, and largely from the fact that few station managers understand the advantages of employing a good chief engineer.

## CHAPTER IV.

## ELECTRICAL DEPARTMENT.

THE reports and records for this department are necessarily more in number and worked out in greater detail than those of other departments. The blanks required are as follows :

- No. 3. Report of Circuit Tests.
- “ 4. Inspector's Report.
- “ 4A. Complaint Card.
- “ 6. Dynamo Engineer's Report.
- “ 6A. “ “ “ (small).
- “ 7. Daily Lamp Record.
- “ 7A. Arc Switchboard.
- “ 8. Ampere Report.

Jointly with the Superintendent of Construction the Circuit Register Blank No. 3 is used.

The dynamo engineer is the executive officer of the dynamo and lamp departments and under the supervision of the electrician, who, by the way, is usually the superintendent. The dynamo engineer has charge of the switchboards, dynamos, lamps, and in fact all electrical machinery and repairs on the same.

He must see that the circuits are in proper condition to run as tested from the switchboard, and by this we mean chiefly the arc circuits, as incandescent and some power circuits are run all the time, and can have only such tests as are made by ground lamps and detectors, of which there are many very good ones to be had.

Arc circuits, when not in use, are tested three or more times per day for continuity and grounds, and if found in any

way defective, are immediately reported to the superintendent, who sends some one to hunt up the faults. At present such

(P. 2)

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\_\_\_\_\_  
Company.

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### *Report of Circuit Tests.*

*All Circuits not mentioned below are in every way O. K.*

TIME	CONDITION AND TIME TROUBLE REMOVED.

### REMARKS.

*State condition of weather at each time of test.*

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Signed, \_\_\_\_\_ Inspector.

FORM 3.

testing is done with the ordinary magneto-bell, but the galvanometer is coming more into use as the managers become

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\_\_\_\_\_ Company  
\_\_\_\_\_ 189

*Weather at Midnight*\_\_\_\_\_

[illegible]

Signed, \_\_\_\_\_ Inspector.

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acquainted with it. Soon we hope to make and use blanks which shall record the insulation of all lines. After starting, the circuits should be tested every hour with ground wires through high resistance, say a bank of incandescent lamps. Mr. M. D. Law, formerly of Philadelphia, made a very ingenious use of the lamp blank. His lamps, for full c. p., required about 50 volts. He placed a number in series with a voltmeter across the terminals of one of them to indicate when full potential or c. p. was reached. Then by turning off lamps until a number

[Form 4a.] Copyrighted 1889.

Complaint received at \_\_\_\_\_ M.  
by Telephone or Messenger.  
from \_\_\_\_\_  
No. \_\_\_\_\_ Street.

That \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Remedied satisfactorily \_\_\_\_\_ 189  
at \_\_\_\_\_ M. Signed, \_\_\_\_\_

FORM 4A.

showed full potential, he could tell by that number about where his ground was located on that particular circuit.

As in all well-regulated stations there is generally serious trouble on only a few circuits, it is thought unnecessary to make mention of circuits other than those which have faults. Therefore we think Form No. 3 herewith covers the ground.

The condition of the weather cannot be stated at too many parts of the day, hence the number of reports having a line for that condition.

Inspector's report, Form No. 4, is used by night circuit inspectors, and in fact by any one who has a statement to make in



regard to the condition of circuits or apparatus. For instance, trimmers report lamps out of condition, globes broken or other faults. Inspectors report lamps out, with the cause and the time out. This is recorded the next day on the lighting regis-

[FORM 7A.]

Copyright 1911.

Company.

Dated \_\_\_\_\_ 189

**ARC SWITCH BOARD.**

*The following arrangement of Circuits and Dynamos will be used until further notice.*

Signed, \_\_\_\_\_ Dynamo Engineer.

No. Dynamo.	NUMBERS OF CIRCUITS WITH NUMBER LAMPS EACH	TOTAL LAMPS.
	TOTAL	

**START CIRCUITS AS FOLLOWS.**

All City Circuits \_\_\_\_\_ at \_\_\_\_\_ M.

Commercial Arc Circuits, Numbers \_\_\_\_\_

\_\_\_\_\_ at \_\_\_\_\_ M.

Motor Circuits, Numbers \_\_\_\_\_ at \_\_\_\_\_ M.

**STOP CIRCUITS AS FOLLOWS:**

All City Circuits \_\_\_\_\_ at \_\_\_\_\_ M

Commercial Arc Circuits, Numbers \_\_\_\_\_

\_\_\_\_\_ at \_\_\_\_\_ M

Motor Circuits, Numbers \_\_\_\_\_ at \_\_\_\_\_ M.

FORM 7A.

ter, and if confirmed by the trimmer's report or book, is deducted as rebate from the customer's bill. Incandescent or motor inspector's report refers to switches, fuses, cut-outs, lamps renewed, etc.

Form No. 4A is a general complaint card and is used for re-

cording any trouble of which notice is sent in by customers by telephone or messenger, the proper word being crossed off to leave the other. These complaint cards are placed on a convenient hook where the inspectors can find them the first thing on entering the station. The inspectors must attend to them at once. When remedied and signed they are turned into the office and filed in their proper place for further reference. It is certain that they will be needed many times to settle disputed bills.

Incandescent and motor circuits are generally run from buss bars, as in the direct-current systems, or are switched from machine to machine when the indicators show increase or decrease of load, as in the alternating system. Therefore it is quite unnecessary to post any card showing layout of circuits on the switchboard. In arc lighting, however, it is different, and for stations having a number of dynamos it is quite essential that some special schedule of circuits be posted to enable the switchboard tender to arrange the circuits and machines to the best advantage. Form No. 7A is advanced for this, and covers about all the points necessary to know as to what dynamos to use for the circuits and when to start and stop the same. This sheet is compiled from the circuit register, Form No. 23, which is made up by the superintendent or superintendent of construction from reports of work done during the day, showing both construction of line and installation of new lamps.

By the use of both of the above forms, viz., 7A and 23, Form 7, the Daily Lamp Record, is filled out by the dynamo engineer. The object of this last report is to give the exact number of equivalent arc lamps burned during the 24 hours by arc lamps, and such other installation as are usually allied with them, such as series incandescents and arc or constant current motors.

This blank will be found of great convenience in figuring

**[Form 23.]**

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Station	to	to	to	to
Circuit No.				
Make of Wire				
Gauge of Wire				
Total Length				ft.

[illegible]

**FORM 23.**

costs, and, together with Form No. 8, the Ampere Report, gives the proportions and amount of output on which are based the calculations of all costs. Of course the report of ampere hours has to be reduced to its equivalent of arc lamps, of the c. p.

(Form 7.)

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## DAILY ARC LAMP RECORD

For

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Style	Candle Power.	Number of Lamps.	Time Started.	Time Cut-out.	Hours Run.	Number Lamps Cut-out for Trouble.	Hours Cut-out for Trouble.	Total Lamp hours at c. p. Equivalent.
City	2000							
	1200							
Commercial Arc	3000							
	1200							
Series.	32							
	65							
Motors.	H. P.							
Totals.								
Average hours burning per lamp.								

FORM 7.

used in the special station. This is easily done by a comparison of watts consumed by both arc and incandescents, which will give the proper basis for reduction. In figuring many hundreds of ampere reports for alternating circuits, the writer

has found the following simple rule of great use in expediting calculation: Where alternating currents of 1,000 volts are used and the lamps are 50 volts or the factor of reduction is 20, the readings being taken every half hour, by adding a cipher to the footing of the column of readings you have the lamp or ampere hours without any calculation whatever. For example, suppose the half-hour readings are 12 and the total amount is 534, by adding a cipher it becomes 5,340 lamp hours at once. The following is the explanation:  $534 \div 12$  the number of readings gives us 44.5 as the average reading, and multiplied by 6 the number of hours makes 367 total ampere hours in the

(Form 8.) Copyright 1911  
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**Ampere Record 24 hours, ending 6 o'clock A. M., to-day.**

Maximum \_\_\_\_\_ amps. Minimum \_\_\_\_\_ amps. Average \_\_\_\_\_ amps.  
 Equivalent 10 c. p. \_\_\_\_\_ lamps. Equivalent 10 c. p. \_\_\_\_\_ lamps Equivalent 10 c. p. \_\_\_\_\_ lamps

TIME	Feeder No.	Feeder No.	Feeder No.	Feeder No.	Feeder No.	Feeder No.	Feeder No.	Feeder No.	Feeder No.	Feeder No.	TOTAL
6.30 A. M.											
7											
7.30											
8											
8.30											

FORM 8.

primary circuit; 20 lamps go to the ampere; therefore we multiply by that figure, which gives 5,340 (or the same result as above). If officials wish to go still further into detail, these ampere readings can be plotted on a cross-section card, thus giving a very handy curve or load diagram which is exceedingly useful in showing to the eye at once any faults with the circuits or stoppages, and how the business is running in general.

From all these reports the dynamo engineer gathers data for his own, which is somewhat contracted, and does not of necessity contain much of any of them. No. 6 and 6A are two sizes of this, and contain place for mention of names, time of employees, and the times of the different runs, as well as the



time of starting and stopping dynamos, this last being taken from the arc switchboard list, and report of dynamo tender as

(Form 6a)

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Company.

*Dynamo Engineer's Report.*

***-189***

[illegible]

**Dynamo Engineer.**

**FORM 6A.**

to the running of the other machines. In this again, as in the chief engineer's report, the store-room is depended on for a statement of supplies used.





ports of new contracts and such data taken from the office. It serves to state as briefly as possible the general condition of the station departments to the officials in authority. It serves also to record any changes or other matter, which it is well to note for future reference.

## CHAPTER V.

## STOREROOM BLANKS.

THE supply department in stations large enough to afford it should have a good storekeeper, one who can keep clean records and make out his reports accurately and on time. In smaller places this department is easily attended to by the

[FORM 10.]

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## STOREHOUSE ORDER.

..... Company.

..... 189

*Please deliver to bearer for*

..... Order No. ....

.....

..... Foreman.

FORM 10.

office clerk, and in his absence on collections or other duties the key can be turned over to some member of the day force around the station. As all orders for supplies must be accompanied by the proper requisition from foreman (blank No. 10), all material is easily accounted for. It is very important that the foreman or department head should sign all supply orders for construction material, as it many times saves dispute.

In the case of the general operating supplies, such as car-

bons, waste, oil, etc., a supply order is written and signed by the man who gets the material, and it must show the proper order number of the department for which it is intended. Figures of coal and water supply are taken from the engineer's daily report.

The storekeeper's records are a receiving book in which are entered all supplies received, stating date received, whom from, items and any unusual particulars. This book comes in very handily in checking up bills, and is also very convenient for future reference. A delivery book is needed also on which are entered all supplies drawn out on requisition of the foreman and

Order No. _____ _____ 189  Filled _____ 189	<small>(Form No. 11.)</small> <i>Storekeeper's Order for Supplies.</i> No. _____ 189 _____ Manager. <i>Please order at once for stock.</i> <hr/> Signed _____ Storekeeper.
--	--

FORM 11.

operating departments, it being made up from the requisition tickets, and in case of a large breakage of incandescent lamps it is very convenient to keep a register of such lamps, giving the name of the customer and having a number of columns, say one for each month, thus showing at what point in a circuit the lamp breakage may be excessive, and at the same time the part of the year when it is the heaviest. Such a record also gives a good basis on which to calculate the average life of lamps. Each incandescent lamp taken from the store-room should be accounted for by the return of either an unbroken lamp or its base.

The blanks for use of the storekeeper are No. 11, order for stock, a tag for lamp, motor or transformer, in fact any article

returned from outside the station for repairs or anything else; Blank No. 12, his weekly report for supplies used; No. 13, for operating, and No. 14, for construction material.

[FORM 12.]

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*Sgl. Dbl.**Lamp No.*.....*Brought in*.....**189***From*.....*Street.**Circuit No.*.....*Trimmer*.....*Inspector*.....*Why returned :*.....*Repaired by*.....*Turned in to storekeeper*.....**189**

FORM 12.

The above blanks are all very simple, and, with the exception of No. 13, require no explanation. No. 13 is made by the

# OPERATING SHEET.

Storekeeper's Report for

ending

189

Entered Journal, page

Day and Date	Cubic Feet Water.	Coal.	LUBRICATOR.				Pounds Waste.	Vards Rags.	CARBON.				CITY.	INCIDENTS & REPAIRS.				SUNDRY PARTS FOR ELECTRICAL REPAIRS	SUNDRY PARTS FOR MOTIVE POWER REPAIRS
			Oil.	Oil.	Oil.	Oil.			M. in C. C.	IN.	IN.	IN.		IN.	IN.	IN.	IN.		
SUNDAY																			
MONDAY																			
TUESDAY																			
WEDNESDAY																			
THURSDAY																			
FRIDAY																			
SATURDAY																			
TOTAL																			
PERCENT																			
AMOUNTS.																			
TOTAL																			

Form 14.

# CONSTRUCTION SHEET.

Copyright 1918

Storekeeper's Report for \_\_\_\_\_ ending \_\_\_\_\_ 189 \_\_\_\_\_ Entered Journal, page \_\_\_\_\_

POLE OR OVERHEAD LINES.	Price.	Amount.	INSIDE WIRING.	Price.	Amount.	STATION AND BUILDINGS.	Price.	Amount.

FORM 14.

week and each day is stated, as it is then easy at any time to divide the week into any parts, as, say, when the first of a month comes on Thursday, and all other reports are made from the 1st to the 31st.

The writer advocates the keeping of a regular supply account in the ledger, to which are charged all bills for supplies entering the station, and to which are credited all supplies taken out for the business, as per the weekly reports Nos. 13 and 14, which can then be journalized like any other bill. When this is done it is easy to give a complete and quite accurate statement of the financial condition of the business at any stated time, say monthly, and the balance of the supply account can be tested yearly by a complete inventory of stock on hand, when any difference can be charged off. The storekeeper should also be provided with a blank receipt for goods sold outside. No special form is mentioned here, as there are many good ones already made, which can be procured at any stationery store.

## CHAPTER VI.

## PAY ROLL DEPARTMENT.

IN most stations very little attention is given to classification in this department, but much good will come of doing so,

[FORM 15.]

Copyrighted 1891.

..... Company.

..... 189

*Time Card for 24 hours ending 7 o'clock,  
A. M., this date.*

**THIS CARD MUST BE IN OFFICE BEFORE 8 A. M.**

*Name,* .....

*Occupation,* .....

Order Number.	Hours Regular.	Hours Extra.	Rate.	Amount.

*Approved,*

..... *Foreman.*

FORM 15.

as only in such methods can any accurate calculation of costs be made.

Although not absolutely necessary for those persons em-



# *PAY ROLL for week ending \_\_\_\_\_ 1891.*

*We, the undersigned, have this \_\_\_\_\_ day of \_\_\_\_\_ 1891, received the amount set against our respective names in full payment to date.*

NAME.	Number	OCCUPATION	Days	Rate	Operating	Outside Construction	Inside Construction	Amount Due	Number	SIGNATURE.

FORM 18.

ployed on the usual routine work, such as firemen, dynamo oilers, storekeeper and clerks, and some few others who work on salary, every employee should be compelled to turn in a time card every day, with the time devoted to different jobs stated under the regular order number, and countersigned or approved by his foreman or chief. Only in this way can disputes as to the man's pay and the cost of work be surely settled.

Any neglect of the man is sure to be made up and to cease after a few losses of pay.

Form No. 15 works well for this, and when on construction or repairs the results are easily posted in the proper order or cost book. For ordinary station work it will be found sufficient to divide the time books and pay-roll into, say, three different accounts, viz : "Operating, pole-line construction, and inside wiring." Then in entering the pay-roll in the cash book, the items can be stated under their different heads and posted to the proper account. Form No. 16 has been found sufficient to fit the case. Time books of various good forms can be had of any stationery store.

## CHAPTER VII.

## OPERATING EXPENSES.

HAVING our reports of departments now in shape at the end of some stated period, say, a week or a month, recapitulation of all the operating expenses should be made on blank No. 17.

The first three divisions are taken directly from pay-rolls; the next is from the Storekeeper's Report, No. 13, of supplies issued for operating, and the last two divisions are filled in by the clerk from office data. The first column for figures is for the amount or value of the individual items, the second column for all those items which are common expense to all departments of output, such as coal, water, cylinder oil, superintendence, &c.

The third column is for such items as are used for arc expense only, including trimmers, carbons, globes, &c.; the fourth is for incandescent expense, like lamp breakage, inspector, &c., and the fifth column for motor expense only, including brushes and other supplies used expressly and exclusively for that purpose.

The footing of the second column of "common to all" is divided among the columns three, four and five in proportion to the amount of the weekly or periodical output of each class, all, of course, being reduced to a common base unit, say, equivalent to full arc lamp hours. The total footing of these last three columns thus gives the total cost of producing the number of units of output of each class, and, by division, the cost per unit of the same.

In the average station, such as is considered throughout in these reports, it will be found most convenient to take the arc

Form 17

Operating Expenses for the \_\_\_\_\_ ending \_\_\_\_\_ 189

		Amount.	Common to All.	Acc. only.	Incandescent only.	Water only.
PAY ROLL:	Motive Power					
	Chief Engineer _____					
	Assistant Engineers _____					
	Oilers _____					
	Firemen _____					
	Coal Passers _____					
	Labor, Repairs on Power Plant _____					
	Electrician _____					
	Dynamo Engineers _____					
	" Cleaners _____					
" Oilers _____						
Day Inspectors _____						
Night " _____						
Trimmers _____						
Labor Repairs on Apparatus _____						
" " " Line and Cable _____						
" Testing _____						
Office.	General Superintendent _____					
	Cashier _____					
	Book keeper and Clerks _____					
	Unwasmers _____					
	Collectors _____					
	Stock Clerk _____					
	Stenographer _____					
	Watchman _____					
SUPPLIES: Storekeeper's Report.	Water _____					
	Coal and other Fuel _____					
	Oil, Machine _____					
	" Cylinder _____					
	Grease _____					
	Waste and Rags _____					
	Carbide _____					
	Glasses Replaced _____					
	Incandescents Breakage _____					
	Sundry Repair parts _____					
Office and Current Expense.	Telephone _____					
	Carriage and Horse Hire _____					
	Freight and Express _____					
	Stationery _____ Telegrams _____					
	Gas and other Lights _____					
	Pole and Line Rents _____					
	Conduit Rents _____					
	Extraordinary _____					
	Sundry Office Expenses _____					
	Amounts _____					
Proportional Parts _____ Totals _____						
Fixed Charges.	Interest _____					
	Insurance _____					
	Taxes _____					
	Licenses _____					
	Rent of Station or Power _____					
	" " Offices _____					
	Legal _____					
	Officiale _____					
	Amounts _____					
	Proportional Parts _____					
GRAND TOTAL _____						

FORM 17.

lamp of the class used therein for a base unit and reduce all other outputs to that unit by comparing the number of watts used by each. Motors are somewhat more difficult of calcula-

Form 18.		Reported for	
Summary for		ending 189	
REVENUE.	Arc Lights, City		
	" Commercial		
	Arc Motors		
	Incandescent Motors		
	Incandescent Lights, Contract		
	" " Meter		
	Rents		
	Other Income		
	Total Revenue		
	Less Rebates for the		
TOTAL INCOME			
" EXPENSE			
Gain for			
Loss for			
OUTPUT STATEMENT.	Number Arc Lamps Burning Saturday Night		
	" Incandescent Lamps Burning Saturday Night		
	" H. P. Motors Installed		
	Total Lamp hours for		
	" " " Arc		
	" " " Incandescent		
	" " " Equivalent Arcs for		
	" " " " Motors		
	Total Equivalent		
	c. p. Arc Lamp hours		
Average hours run per day			
" " " Arcs			
" " " Incandescents			
COSTS.	Operating Expense for Arcs	Amount.	Per Lamp.
	Fixed Charges		
	Total Cost per Arc Lamp hour		
	" Income per Arc Lamp hour		
	Gain or Loss		
	Operating Expense per Arc Equivalent to Incandescent	Amount.	Per Lamp.
	Fixed Charges		
	Total Cost per Arc hour		
	Income		
	Gain or Loss		
Total Cost per 10 c. p. Lamp hour			
" Income			
Gain or Loss			
REPORTS.			

FORM 18.

tion, but taking one h. p. of motor as equal to one full arc lamp will be found nearly correct, as the motors are seldom run regularly up to full power.

In calculating costs by the above method it will be noticed that actual count is taken in all arc lamp work, whereas the ampere record is taken for output from the incandescent circuits. The two classes of service are so entirely different that it is quite difficult to bring them closely into line on any fair basis, and as the loss on arc wire service is comparatively small and constant, and as the same is varying constantly with the load on incandescent service, it is thought to be the best way to take the surest points of both. As a matter of fact, the calculation of costs must be made comparatively, and if costs are figured on output at the switchboard, and income is figured on the same basis, the comparison for profit is the same as if it be figured on, say, the total number of lamps wired. Again, in figuring for costs per incandescent lamp wired, and income for the same, it would hardly be fair to compare a station which kept current on only during a short period with one running 24 hours a day.

To accompany the expense account, Form 18 is made to show the income account for the same base units, and all data for unit costs is written in on this blank. The clerk can fill out this sheet mostly from office data, and can also do all the calculating.

## CHAPTER VIII.

## DEPARTMENT OF ACCOUNTS.

In this department the first item is the Contract, or, as the writer prefers to call it, the "Application," which is, of course, preliminary to all business. Blank No. 19 will be found convenient as furnishing all necessary data and conditions. The

(Form 19.)

Registered 2111.

APPLICATION.															Number _____	
Dated, _____ 189__																
THE _____ ELECTRIC LIGHT AND POWER COMPANY.																
Please place on _____ premises, No. _____																
in such position as designated by _____ Electric Lights or _____ as follows.																
ARCS		Watts per Hour		Hours or Days		INCANDESCENTS						MOTORS			Period of Current in Month, from time of first Lighting.	
						From	To	No.	W.	H.	P.	H.	P.	H.		P.

and supply the above with electric current daily as stated, for which I agree to pay (monthly), at the rate of \_\_\_\_\_ cts. per night for arc lamps, and \_\_\_\_\_ cts. per \_\_\_\_\_ hour for current, supplied through meter, or \_\_\_\_\_ per month per incandescent lamp, or motor, if so supplied. It is understood and agreed that you are to furnish all apparatus, fixtures and material for arc lights, and make all connections from your main circuits, also connections to circuits for incandescent lighting or motors. And it is agreed that all fixtures for incandescent lighting are to be furnished by \_\_\_\_\_ and that you are to do the wiring, which shall be \_\_\_\_\_ work, and for which \_\_\_\_\_ agree to pay at the rate of \_\_\_\_\_ per lamp. This application is subject to the conditions printed on the back, and of which they are to be considered a part.

Accepted \_\_\_\_\_ 189\_\_      WITNESS \_\_\_\_\_      SIGNED \_\_\_\_\_

By \_\_\_\_\_

AGENTS ARE NOT AUTHORIZED TO MAKE ANY AGREEMENT OR VERBAL PROMISE OUTSIDE OF THE TERMS OF THIS CONTRACT.

FORM 19.

usual form or contract is a large document of legal appearance, and is apt to frighten prospective customers off. By presenting this small slip, headed "application," *not* contract, it is found to be much easier to secure its signature. When the application has been accepted by the company an installation order should be issued to the superintendent or other proper authority using the regular Order Blank No. 1. In this connection it is convenient to have a couple of rubber stamps, one for arc and one for incandescents, which will stamp all form of data on the face of the order blank. No. 1 stamp reads as follows :

**Total Labor "B."**Truck,  
Helpers,  
Linemen,  
Foreman,**Total Material "B."**

Fuse,

Screws,  
Solder,

Oxal. Acid, Oxs.

Tape,

Lag Screws,

Screw Eyes,

Porcelain Circuit Breaker,

Porcelain Knobs,

Pins or Brackets,

Deep Groove Insulators,

Wire,

**Total Labor "A."**Truck,  
Helpers,  
Linemen,  
Foreman,**Total Material "A."**Tubing,  
Take style,

ft. Hard, ft. Soft,

Screws,  
Solder,

Oxs.

Acid,

Moulding,  
Cleats,

Silk Cord,

Wire,

**REVERSE OF FORM 21**

Copyrighted 1901.

Installation Order No.

By \_\_\_\_\_  
"Cost Book,"  
"Circuit Register,"  
"Construction Book,"  
In Lighting Ledger, page \_\_\_\_\_  
Recorded \_\_\_\_\_ 189\_\_\_\_\_  
Inspector \_\_\_\_\_  
Started to post \_\_\_\_\_ 189\_\_\_\_\_  
On branch \_\_\_\_\_  
of Order No. \_\_\_\_\_ 189\_\_\_\_\_  
Contract \_\_\_\_\_ 189\_\_\_\_\_



by you is the consideration for ..... agreement herein.

8th. That the subscriber will grant to your Company all necessary privileges for introducing and maintaining said lamps or other equipments and wires, the placing of the lamps and equipments and furnishing lights in accordance with the rules of the Board of Fire Underwriters; and when the placing of the lamps or other equipments inside the building is done in accordance with the rules of the Board of Fire Underwriters; and Company is hereby released from all claims on account of damage by fire.

9th. That claims for non-service to be valid, shall be made in writing within one week of the time when such non service has occurred.

10th. That deduction from its bills for the actual time of such failure, this contract, nor render said Company liable for damages, beyond a Company, to furnish said lights shall not cancel.

11th. That any failure on the part of the ..... for pay

other equipments made at ..... request, shall be paid

12th. That all expense of alterations in the position of the lamps or pipes as first contracted for.

13th. That it is understood and agreed that such continuance shall in writing to said

of this contract, for three days, and no notice of discontinuance be given

14th. That should the service of current be continued beyond the term of this contract shall thereupon become due and payable.

15th. That if payment be not made as herein agreed, the whole amount your employees who show Company Badge.

16th. That inside the building, allowing no person to have access thereto, except lamps and other equipments, and be responsible for the safe keeping of the same inside the building, will exercise due care for the protection of the

Order No. .... issued

Expires

Stated Burning

Street.

Name

Dated

Application No. ....

REVERSE OF FORM 10.

**DIAGRAM No. 1.**

INSTALL ON PREMISES OF

.....  
 No.....Street.  
 .....arc lamps,  
 as per contract number.....  
 To burn until.....o'clock.....days, for.....months  
 Trimmer.....  
 Inspector.....  
 Recorded.....189  
 In circuit register, page.....  
 Lighting register, page.....  
 By.....

These rubber stamp diagrams, Nos. 1 and 2, are made of such size as to fit on the face of Order Blank No. 1.

And the No. 2 stamp, as below :

**DIAGRAM No. 2.**

INSTALL ON PREMISES OF

.....  
 No.....Street,  
 as per contract number.....  
 .....c. p. incandescent lamps,  
 To burn until.....o'clock.....days, for.....months,  
 on Meter or Contract.  
 Inspector.....  
 Recorded.....189  
 In circuit register, page.....  
 Lighting register, page.....  
 By.....

This order, when properly returned with stock and labor list on the back, gives a complete record of the cost of that particular installation, which can be copied into the proper account books, as indicated by portions of the diagrams.

(Form No. 20.) Copyright 1914.

Issued \_\_\_\_\_ 1914

To \_\_\_\_\_ Foreman.

INSTALL ON PREMISES OF

No. \_\_\_\_\_ Street,

as per Application No. \_\_\_\_\_

\_\_\_\_\_ Arc lamps of \_\_\_\_\_ C. P.

\_\_\_\_\_ Series lamps of \_\_\_\_\_ C. P.

Placed \_\_\_\_\_

To burn until \_\_\_\_\_ o'clock \_\_\_\_\_ days \_\_\_\_\_ year.

Signed \_\_\_\_\_ Foreman.

Lamp \_\_\_\_\_ single \_\_\_\_\_ double,

Outrigger \_\_\_\_\_

Hoods \_\_\_\_\_ single \_\_\_\_\_ double,

Indoor hanging boards, complete, \_\_\_\_\_

Globes, \_\_\_\_\_

Shades, \_\_\_\_\_

Series lamps, \_\_\_\_\_ C. P.

Total Property, \_\_\_\_\_

Wire, \_\_\_\_\_

\_\_\_\_\_

Deep Groove Insulators, \_\_\_\_\_

Pins or Brackets, \_\_\_\_\_

Brown's Pins, \_\_\_\_\_ Glasses \_\_\_\_\_

Porcelain knobs, \_\_\_\_\_

Porcelain circuit breakers, \_\_\_\_\_

Tape, \_\_\_\_\_

Solder, \_\_\_\_\_

Screw Eyes, \_\_\_\_\_

Lag Screws, \_\_\_\_\_

Arc cut-out style, \_\_\_\_\_

Screws, \_\_\_\_\_

Total Material, \_\_\_\_\_

Foreman, \_\_\_\_\_

Linemen, \_\_\_\_\_

Helpers, \_\_\_\_\_

Truck, \_\_\_\_\_

Total Labor, \_\_\_\_\_

Property Installed, \_\_\_\_\_

Cost of Installation, \_\_\_\_\_

Cost in \_\_\_\_\_ 1914

On circuit No. \_\_\_\_\_

Started to burn, \_\_\_\_\_ 1914

Trimmer, \_\_\_\_\_

Inspector, \_\_\_\_\_

Recorded, \_\_\_\_\_ 1914

In. Lighting ledger, page \_\_\_\_\_

" Construction book, page \_\_\_\_\_

" Cost book, page \_\_\_\_\_

" Circuit register, page \_\_\_\_\_

By \_\_\_\_\_

FORM 20.

Some larger stations will prefer a special order blank for installation work, and in many cases it is very convenient, as employees often forget items unless they are printed for them

Form No. 21

Issued \_\_\_\_\_ 190\_\_

To \_\_\_\_\_ Foreman

INSTALL ON PREMISES OF \_\_\_\_\_

No. \_\_\_\_\_ Street \_\_\_\_\_

as per application No. \_\_\_\_\_

\_\_\_\_\_ G. P. Incandescent Lamps

To burn until \_\_\_\_\_ o'clock \_\_\_\_\_ days \_\_\_\_\_ year

To burn by Meter \_\_\_\_\_

Style of Wiring \_\_\_\_\_ Chest \_\_\_\_\_ Moulding \_\_\_\_\_ Connected

Signed \_\_\_\_\_ Foreman

Sockets \_\_\_\_\_ bay, \_\_\_\_\_ bayless \_\_\_\_\_

Out-outs, style \_\_\_\_\_

Route out-outs, style \_\_\_\_\_

Chandelier out-outs, style \_\_\_\_\_

Switches, \_\_\_\_\_

Rubber bushings, style \_\_\_\_\_

Gas taps, \_\_\_\_\_

Lamps, \_\_\_\_\_ G. P. \_\_\_\_\_

Rhodes, \_\_\_\_\_

Holders, \_\_\_\_\_

Aster No. \_\_\_\_\_ Capacity, \_\_\_\_\_ Factor \_\_\_\_\_

Total Property "A."

Converter, Type \_\_\_\_\_

Converter, Box \_\_\_\_\_

Primary Switch, Type \_\_\_\_\_

Junction Boxes, \_\_\_\_\_

Lighting Arranger, \_\_\_\_\_

Total Property "B."

A. Property, \_\_\_\_\_

Cost of installing, \_\_\_\_\_

B. Property, \_\_\_\_\_

Cost of installing, \_\_\_\_\_

A. Property per lamp, \_\_\_\_\_

Cost of installing per lamp, \_\_\_\_\_

B. Property per lamp, \_\_\_\_\_

Cost of installing per lamp, \_\_\_\_\_

FORM 21.

in plain sight. Blanks Nos. 20 and 21 have been used largely by the writer for this purpose and are found to be entirely satisfactory. With the Application Blank No. 19, there must also be included another blank, No. 22, which is used for any

future increase of the first application, and, being of a different color and filed with the original, it is easily distinguished.

For convenience of reference it is well to have a contract book with all the proper headings giving all necessary items and index for reference. If a separate ledger account is kept with each customer, all such data can be put in under the page heading, and is easier of reference than if in a separate book. It will be noticed that the lighting register, Form No. 28, has columns for all data necessary to record from installation orders. When the installation is completed, the order is returned to the office and filed until the lights are started; then the time of

(Form 22)	Copyright 1918
<b>INCREASE APPLICATION.</b>	
_____ 189	
The undersigned requests the _____ Company to install	
on premises No. _____ in such position as may be designated by	
_____	
the same being in addition to _____ original application No. _____ of _____ 189	
and subject to the same requirements and conditions.	
Accepted _____ 189	Signed _____
ELECTRIC LIGHT CO	
per _____	Manager Witness _____

FORM 22.

starting is recorded on the slip and all items of record entered in the proper books, such as the lighting register or ledger, the trimmer's book or meter book, circuit register, Form No. 23, and posted on the bulletin board, so that inspectors may know where to find it.

In respect to methods of reporting arc lamps burned, there are probably as many as there are of running a station. It must be admitted that most of them are negative reports in that only those lamps which did not burn are mentioned, and those not surely.

The writer considers it much better to use what may be

*Lighting Register for*

*the Month of* \_\_\_\_\_ 189

[illegible]

**FORM 28.**

called the positive method, and report every lamp trimmed, with the customer's name and location, and for such method advances Blank No. 5. It is thought best to make this report on loose sheets, which will be written up by the clerk and placed in loose covers, where the trimmer can fill in for the week, and

Form 52

Copyright 1911

*Lamps Burned week ending* \_\_\_\_\_ *189* , by \_\_\_\_\_ *Trimmer.*

NAME OF CUSTOMER.	ADDRESS.	CIRCUIT NUMBER.	Lamps										Total Lamps.	RATE.	AMOUNT DUE.	LBN. PAGE.
			1	2	3	4	5	6	7	8	9	10				

FORM 5.

then fresh sheets can be inserted and the completed ones entered by the clerk in the lighting register or ledger.

Where stations are full and a load of good, steady customers is connected, the sheets can be furnished with the customers' names all printed in, so as to save a great deal of tedious writing by the clerk every week.

If the old negative method is considered good enough, then Form No. 28 for a lighting register is put forward as embody-

Form 24

Copyright 1911

*Meter Readings for* \_\_\_\_\_ *reading* \_\_\_\_\_ *189* by \_\_\_\_\_

NAME OF CUSTOMER.	ADDRESS.	No. of METERS.	PRESENT READING.	PREVIOUS READING.	DIFFERENCE.	BILLS PAID.	AMOUNT DUE.	LBN. PAGE.

FORM 24.

ing all the points necessary for either weekly, bi-weekly, or monthly accounts, and any lamps reported as not burning either by the trimmer or inspector, or both, can be checked off every day and the rest be entered as O. K.

Form No. 5 is also used by the incandescent inspector to record the number of lamps burned daily by customers having monthly or contract rates.

Form No. 24 is recommended for recording the reading of meters as taken at stated periods. This also is in loose sheets, to be kept in a holder. All calculations can be made on the

No claims for deductions for Lamps out of order allowed unless made in writing within one week.

The Collector is not authorized to change the amount of this bill. Make all complaints in writing to the Manager.	New York, _____ 189	
	M. _____	
	<b>THE NORTH NEW YORK LIGHTING COMPANY, Dr.</b> 140th Street and Rider Avenue.	
	For Lighting _____ Lamps from _____ to _____ at _____	
	Bill rendered _____	
	Total, . . .	
	Discount for Cash, _____	
	Total Payment, . . .	
	Received Payment _____	
	<b>THE NORTH NEW YORK LIGHTING COMPANY,</b> Per _____	

(Form 24) Copyright 189

FORM 25.

Forms Nos. 5 and 24, and the results only entered in a common ledger, if thought best; in which case it is unnecessary to provide any special form of that book. Many stations have customers so prompt that the above forms are all the accounts

per cent. discount for Cash in \_\_\_\_\_ days from date.

The Collector is not authorized to change the amount of this bill. Make all complaints in writing to the Manager.	For Electric Current furnished _____ Incandescent Lamps, from _____ to _____	
	Present State of Meter, _____	
	Previous State of Meter, _____ Difference, _____ at _____	
	Bill rendered _____	
	Total, . . .	
	Discount for Cash, _____	
	Total Payment, . . .	
	Received Payment, _____	
	By _____ Company	

(Form 25) Copyright 189

FORM 26.

necessary to keep, as when all accounts are settled during the month the lump sum can be credited to lighting account without carrying any customers' accounts at all.



For bills to send to customers for service of light or power, Blank No. 25 is a convenient form for arc lights or motors and monthly or contract incandescent lamps. Blank No. 26 is a bill designed for meter service and can be printed to accommodate stations running on watt-hours, or lamp-hours, or ampere-hours, as desired.

## CHAPTER IX.

## MISCELLANEOUS FORMS.

THE foregoing finish up the blanks used in the department of accounts and leave us only one more of the regular order.

(FORM 27.)

Copyrighted 1901.

\_\_\_\_\_ Company.

\_\_\_\_\_ 189

*Lineman's Report.*

Signed \_\_\_\_\_ Foreman

Number of Linemen \_\_\_\_\_

Number of Helpers \_\_\_\_\_

Truck \_\_\_\_\_

ORDER NUMBER.	GIVE FULL PARTICULARS OF ALL WORK DONE TO-DAY.

FORM 27.

That form is No. 27, Lineman's Report, on which is recorded all work of any nature done by line gangs. It must be filled out in detail by all foremen or any man who has a job all alone; this blank will be all that is necessary outside of the regular Order Blank No. 1.

When electrical apparatus or wires are placed inside of buildings it is necessary to notify the Board of Fire Underwriters immediately of such fact, so that the customer's insurance may not be made invalid. For such notification the form

issued or suggested by the New York Board has been found very convenient, and when a stub is added and is made into books of about 200 pages leaves little to be desired. No. 29 shows this form. I use it here with the kind permission of the Board of Fire Underwriters, through Mr. A. E. Van Gieson.

This finishes the line of regular reports, and it is hoped that they have been found to cover the ground more or less fully. Many stations will require special blanks, and I shall be

<p>No. _____</p> <p>A Survey by the BOARD OF FIRE UNDERWRITERS has been requested of No. _____</p> <p>Occupied by _____</p> <p>Date _____</p> <p>Arranged as follows</p> <p>Cellar _____ Second Floor _____</p> <p>Basement _____ Third Floor _____</p> <p>First Floor _____ Fourth Floor _____</p> <p>Converters placed _____</p> <p>Wire and insulation used -</p> <table border="0"> <tr> <th>FEET.</th> <th>No.</th> <th>INSULATION</th> </tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> <tr><td>_____</td><td>_____</td><td>_____</td></tr> </table> <p>Wires enter _____</p> <p>Certificate No. _____</p> <p>Issued _____</p>	FEET.	No.	INSULATION	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	_____	<p>(Form 29)</p> <p>No. _____ Office of _____</p> <p>_____ City</p> <p><b>TO BOARD OF FIRE UNDERWRITERS:</b></p> <p>GENTLEMEN:</p> <p>This Company has placed _____ Lights with the necessary equipments, in accordance with the regulations of your Board, in the premises No. _____ occupied by _____</p> <p>Arranged as follows:</p> <p>Cellar _____ Lights First Floor _____ Lights Third Floor _____ Lights</p> <p>Basement _____ Lights Second Floor _____ Lights Fourth Floor _____ Lights</p> <p>The converters are placed _____</p> <p>Character of insulation _____</p> <p>Wire enters building at _____ from _____</p> <p>Remarks _____</p> <p>_____</p> <p>_____</p> <p>Please have an inspection made, and, if satisfactory, your certificate issued at your earliest convenience. Respectfully,</p> <p>_____</p>
FEET.	No.	INSULATION																	
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FORM 29.

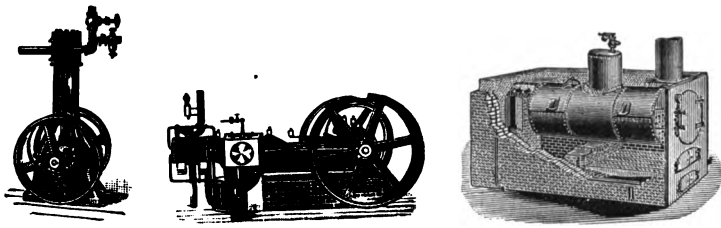
glad to render assistance on application, with proper blanks gotten out to meet the service.

In closing, I will say that the foregoing system of blanks, while not being advanced as absolutely perfect, has been well tried and found to answer the writer's purpose in his own central station work with considerable satisfaction. It is hoped others may find some assistance in them, and that they may lead to a more intelligent knowledge of the costs of maintaining and operating electric lighting and power stations.

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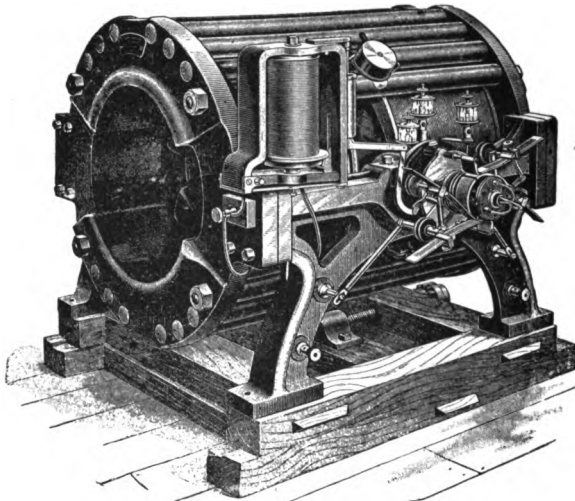
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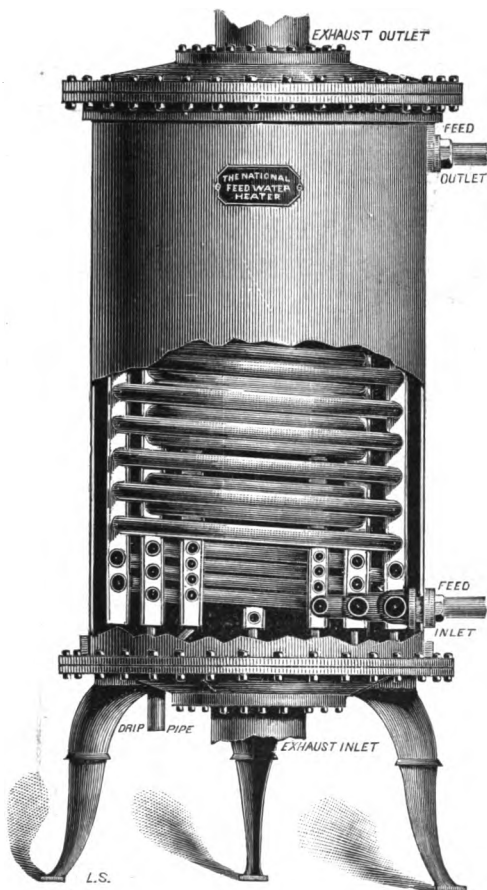
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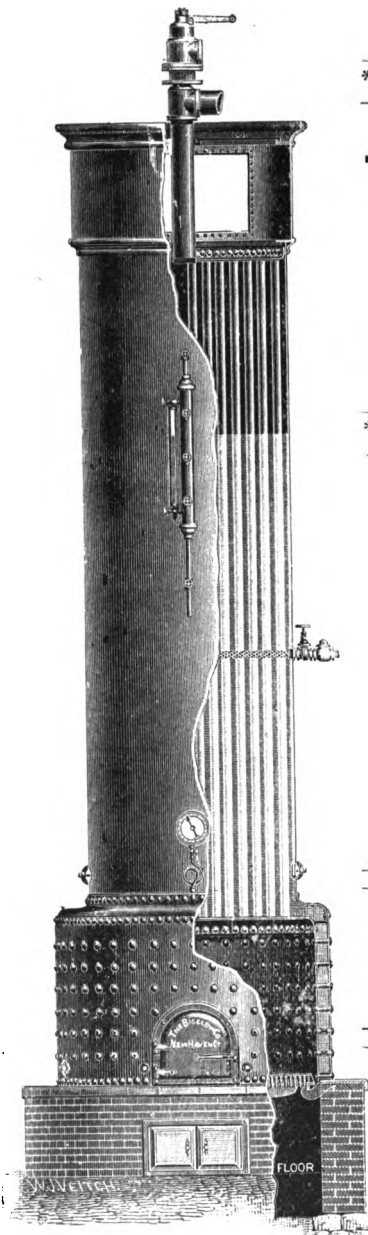
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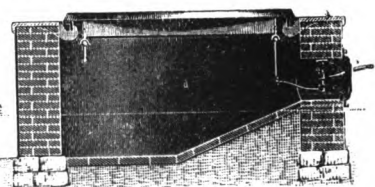


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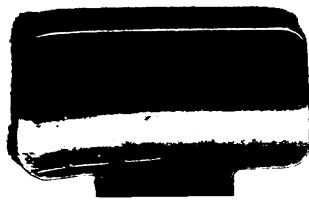


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